Frequency Response Characteristic Calculation for All India based on NLDC SCADA Data

EVENT:	On 17th Jan 2023, As reported at 09:56 hrs, Due to Auxiliary bus fault at Sterlite of Easterner Region led to tripping of all lines and resulted in 1900 MW load loss. After tripping all Generation of 1550 MW started exporting to Grid,Subsequently due SPS action two generators tripped which lead to 752 MW generation loss. Accordingly for FRC Calculation figure of 1148 MW has been considered.For FRC calculation an offset value of 0.053 Hz has been considered in the settling frequency 50.03Hz based on approximate calculation and final settling frequency 50.08 Hz has been considered for calculation in the event.

S No	Particulars	Dimension	NR	ER	WR	NER	SR
1	Actual Net Interchange before the Event (09:55:56)	MW	6317	-10019	-1659	50	4877
2	Actual Net Interchange after the Event (09:56:36)	MW	6602	-10950	-1091	63	5199
3	Change in Net Interchange (2-1)	MW	285	-931	568	13.2	322
4	Generation Loss (+) / Load Throw off (-) during the Event	MW	0	-1148	0	0	0
5	Control Area Response (3 - 4)	MW	285	217	568	13	322
6	Frequency before the Event	HZ	50.04	50.04	50.04	50.04	50.04
7	Frequency after the Event	HZ	50.08	50.08	50.08	50.08	50.08
8	Change in Frequency (7 - 6)	HZ	0.040	0.040	0.040	0.040	0.040
9	Frequency Response Characteristic (5 / 8)	MW/Hz	7126	5431	14206	330	8060
10	Net System Demand met before the Event	MW	60482	19789	69857	2067	53445
11	Internal Generation before the Event (10 - 1)	MW	54165	29809	71516	2017	48568
12	Ideal load response assuming 4% per Hz (0.04*Row 10)	MW/Hz	2419	792	2794	83	2138
13	Ideal generator response assuming 5% droop……….40% per Hz (40% of Row 11)	MW/Hz	21666	11923	28607	807	19427
14	Composite ideal response (12 + 13)	MW/Hz	24085	12715	31401	890	21565
15	Percentage ideal response	%	29.6%	42.7%	45.2%	37.0%	37.4%

(*) - Data may be constant/suspected during the event
Note: +ve exchange=> import ; (-)ve exchange => export

Total Change in (MW)	1148	
FRC for NEWS GRID (dp/df) MW/Hz	28700	
Power Number (net change in MW/maximum change in frequency)	14074	Considering 1900 MW Load loss figure

Source Wise Generation (MW)	GAS	HYDRO	NUCLEAR	Thermal	WIND	SOLAR
	2629	15745	5352	147885	2613	32499